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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,530	03/29/2004	Volker Harle	12406-140001	5329

26161 7590 05/07/2009

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EXAMINER	
LUU, CHUONG A	

ART UNIT	PAPER NUMBER
2892	

NOTIFICATION DATE	DELIVERY MODE
05/07/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/813,530	HARLE ET AL.	
	Examiner	Art Unit	
	Chuong A. Luu	2892	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 5-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26-34* is/are allowed.

6)☒ Claim(s) *1,2,5-7 and 12-25* is/are rejected.

7)☒ Claim(s) *8-11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Applicant's comment*.

DETAILED ACTION

Withdrawn

The indicated allowability of claims 5 and 15-21 is withdrawn in view of the newly discovered reference(s) to Yano et al. (U.S. 6,083,841), Frank (U.S. 5,277,750) and Hayakawa et al. (U.S. 4,845,724).. Rejections based on the newly cited reference(s) follow.

Response to Arguments

Applicant's arguments with respect to claims 1-2 and 5-34 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's Comments

Mr. Phillip confirmed that the supplemental action should be forwarded.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

AUTHORIZATION

Authorization for this examiner's amendment was given in a telephone interview with Mr. Marc Wefer on November 26, 2008.

TO CLAIMS

To add claim 4 into the independent claim 1 and cancel the claim 4.

Therefore, the claim 1:

(1) A method for fabricating a semiconductor component, which comprises the steps of:

providing a semiconductor body containing a substrate (160) and at least one nitride compound semiconductor disposed on the substrate (160) (see Figure 10);

applying a metal layer to a surface of the semiconductor body (see Figure 10); dry-chemically removing a part of the metal layer and a part of the semiconductor body previously covered by the removed metal layer, previously covered by the removed metal layer, wherein the dry-chemically removing is performed by forming a mask on the metal layer, a part of the metal layer not being covered by the mask, removing that part of the metal layer which is not covered by the mask, a part of the surface of the semiconductor body thereby being uncovered and defining an uncovered surface, partially removing the semiconductor body in regions of the uncovered surface, and removing the mask, which further comprises forming the mask as a dielectric mask which contains at least one material selected from the group consisting of silicon oxide, aluminum oxide, silicon nitride, titanium oxide, Ta oxide, zirconium oxide, and a layer system containing at least one of the materials.

PRIOR ART REJECTIONS

Statutory Basis

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The Rejections

Claims 1, 4-5, 7, 12, 14, 17, 20-21 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. (U.S. 6,083,841) in view of Frank (U.S. 5,277,750).

Yano discloses a GaN-based compound semiconductor layer with

Referring to the discussion of Figure 2 [Col. 6, lines 8, *et seq.*], Yano, et al disclose **a method for fabricating a semiconductor component** ["LED chip"; Col. 6, line 12]**, which comprises the steps of: providing a semiconductor body** (11)(12)(13)(14)(15) **containing a substrate** (11) (12) [single crystal sapphire "substrate" (11) with buffer layer (12); Col. 6, lines 13-14; as noted in the present specification at Page 21, lines 19-25, the substrate itself need not be a semiconductor] **and at least one nitride compound semiconductor** (13)(15) [n-type GaN "cladding layer" (13) and p-type cladding layer (15) of AlGaN-based layer (15a) and GaN layer (15b); Col. 6, lines 16 & 22-26] **disposed on the substrate , which further comprises forming the semiconductor body with a radiation-generating active layer** (14) [InGaN-based semiconductor "active layer"; Col. 6, lines 18-19; it is believed that one skilled in the art would recognize the light-emitting layer as the layer (14) between cladding layers (13)(15); in any event, Yano, et al clearly disclose the method as including providing semiconductor layers to emit light; Col. 6, lines 6-7;

note also the disclosure of light emitting layer in the first embodiment applied by the examiner; Col. 4, line 13; a light emitting layer is fairly regarded as an "active" layer]; **applying a** (Ti) **metal layer to a surface of the semiconductor body** [Col. 6, lines 27-28]; **dry-chemically removing a part of the metal layer and a part of the semiconductor body previously covered by the removed metal layer** [Col. 6, lines 36-38, using an RIE process on the metal layer and the CAIBE method on the underlying semiconductor layers], **previously covered by the removed metal layer** [*sic*,see examiner's amendment], **wherein the dry-chemically removing is performed by forming a mask on the metal layer, a part of the metal layer not being covered by the mask** [Col. 6, lines 34-36], **removing that part of the metal layer which is not covered by the mask** [lines 36-38], **a part of the surface of the semiconductor body thereby being uncovered and defining an uncovered surface** [as in Fig. 1(b) where (2) corresponds to layers (13)(14) & (15), (3) corresponds to the metal, and (4) corresponds to the mask; the method being the first etching method and carried out as explained in connection with Fig. 1; Col. 6, lines 27-34], **partially removing the semiconductor body** [down to the n-type cladding layer (13); Col. 6, lines 38-41] **in regions of the uncovered surface, and removing the mask** [as shown in Figure 2, the final structure lacks a mask layer; the method is carried out in a manner similar to the method of Figure 1, wherein it is explained that the ashing step of removing the mask prior to acid removal of the Ti layer, is not illustrated; Col. 4, lines 37-40; thus while the step is not explicitly disclosed in the discussion of Figure 2, it is understood to have been performed, or would at least have been obvious to perform, since Yano, et al teach that such was known as a means to expose the metal layer for acid etching].

Thus, Yano, et al disclose the invention substantially as claimed. However, Yano et al disclose the mask as being a photoresist material rather than disclosing the step of "**forming the mask as a dielectric mask which contains at least one material selected from the group consisting of silicon oxide, aluminum oxide, silicon nitride, titanium, oxide, Ta oxide, zirconium oxide, and a layer system containing at least one of the materials**", as recited in claim 1.

In the same field of endeavor, Frank teaches a hard mask of silicon oxide or silicon nitride as a suitable substitute for a photoresist mask for the purpose of dry-etching metal layers. Thus as argued by the examiner, it would have been obvious to include the step of forming the mask of Yano et al as a dielectric mask of silicon oxide or silicon nitride as recited, since Frank demonstrates that such a mask was an art-recognized equivalent for such purposes, and suggests the substitution. Barring any unexpectedly improved result, it appears that such a selection would have been an obvious matter of choosing a known material, based upon its known suitability for the intended purpose.

Even through, Yano and Frank do not explicitly describe the thickness of the metal layer. However, the thickness of the metal layer is considered to be obvious. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Yano (accordance with the teaching of Frank) since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice, and it also has been held that where the general conditions of a

claim are disclosed in the prior ad, discovering the optimum or workable ranges involves only routine skill in the art and it is noted that the applicant does not disclose criticality in the ranges claimed. In re Leshin, 125 USPQ 416 and In re Aller, 105 USPQ 233 (see MPEP 2144.05). Additionally, since Yano and Frank are both from the same field of endeavor (semiconductors), the purpose disclosed by Frank would have been recognized in the pertinent art of Yano.

With regard to claim 5 recites the method **"which further comprises fabricating the mask photolithographically, in which a photoresist mask is fabricated on the mask."** Even as Frank suggests that a suitable mask would be made of a material selected from the group consisting of silicon oxide and silicon nitride in place of a photoresist mask, he also suggests that the silicon oxide or silicon nitride mask be "structured by a photoresist mask" [Col. 5, lines 55-60; Col. 6, lines 58-61] and used instead of a photoresist mask. Therefore, not only would it have been obvious to one of ordinary skill to employ a silicon oxide or silicon nitride mask in place of the mask of Yano, et al, but it would have been obvious to provide the mask by "structuring" the silicon oxide or silicon nitride by a "photoresist mask", as also suggested by Frank, since Frank teaches such a structured mask as a suitable alternative to a photoresist mask for purpose of dry-etching a metallization, such as that of Yano, et al. One skilled in the art would have recognized that such "structuring" is fairly characterized as "fabricating the mask photolithographically, in which a photoresist mask is fabricated on the mask", as recited.

With regard to claims 7 and 25 recites the method " **which further comprises removing the part of the semiconductor body by an etching method**"(see column 5, lines 21-34).

With regard to claim 12 recite the method " **which further comprises applying a contact metallization**"(see Figure 2).

With regard to claim 17 recites the method **"which further comprises forming the semiconductor body with a radiation-generating active layer."** As discussed in connection with Figure 2, the method of Yano et al is a method of forming a **"luminescence diode"** [as recited in claim 20], and in particular, a **"light-emitting diode"** [as recited in claim 21], wherein the method further comprises forming the semiconductor with a radiation-generating active layer (14) [Col. 6, lines 18-19]. Thus in practicing the method of Yano et al as modified in accordance with Frank, one would have arrived at the invention as claimed.

With regard to claims 20 and 21 as they depend from claim 17, the method of Yano et al, as modified by Frank, would have further included providing metal contact layers and electrodes [Col. 6, lines 45-55] to provide a "luminescent diode", or light-emitting diode (LED) [Col. 6, lines 12 & 57; Col. 7, line 7].

With regard to claim 25 recites the method **"which further comprises removing the metal layer by an etching method"**(see column 5, lines 21-34).

Claims 2 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. (U.S. 6,083,841) in view of Frank (U.S. 5,277,750) and further in view of Cervantes et al. (U.S. 6,379,985).

Yano and Frank teach the above outlined features with the exception of selecting the nitride compound semiconductor as a compound having a formula $Al_yIn_xGa_{1-x-y}N$, $0<x<1$, $0<y<1$, $0<x+y<1$. Furthermore, Cervantes discloses a semiconductor device with **(2)** which further comprises forming the nitride compound semiconductor as a compound having a formula $Al_yIn_xGa_{1-x-y}N$, $0<x<1$, $0<y<1$, $0<x+y<1$ (see column 11, line 3); **(13)** which further comprises forming the metal layer to contain a material selected from the group consisting of platinum and palladium (see column 9, lines 35-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Yano and Frank (accordance with the teaching of Cervantes) since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Additionally, since Yano, Frank and Cervantes are from the same field of endeavor (semiconductors), the purpose disclosed by Cervantes would have been recognized in the pertinent art of Yano and Frank.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. (U.S. 6,083,841) in view of Frank (U.S. 5,277,750) and further in view of Losehand et al. (U.S. 6,448,162).

Yano and Frank teach everything above except for removing the metal layer by a sputtering-back method. Furthermore, Losehand discloses a Schottky diode with **(6)** which further comprises removing the metal layer by a sputtering-back method (see column 4, line 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Yano and Frank (accordance with the teaching of Losehand) since the method of forming a device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight and also it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. Additionally, since Yano, Frank and Losehand are from the same field of endeavor (semiconductors), the purpose disclosed by Losehand would have been recognized in the pertinent art of Yano and Frank.

Claims 15-16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. (U.S. 6,083,841) in view of Frank (U.S. 5,277,750) and further in view of Hayakawa et al. (U.S. 4,845,724).

Yano and Frank disclose teach everything above except for which further comprises forming the semiconductor body to be p-doped in a region adjoining the metal layer; which further comprises doping the p-doped region of the semiconductor body with a material selected from the group consisting of magnesium and zinc; wherein a semiconductor ridge structure is shaped by the partially removing of the semiconductor body step; wherein the semiconductor ridge structure forms a waveguide

at least for parts of radiation generated by the active layer. Furthermore, Hayakawa discloses a semiconductor laser device with **(15)** which further comprises forming the semiconductor body to be p-doped (see column 4, lines 41-53); **(16)** which further comprises doping the p-doped region of the semiconductor body with a material selected from the group consisting of magnesium and zinc (see column 4, lines 41-53); **(18)** wherein a semiconductor ridge structure is shaped by the partially removing of the semiconductor body step (see column 4, lines 9-15); **(19)** wherein the semiconductor ridge structure forms a waveguide at least for parts of radiation generated by the active layer (see column 4, lines 9-15. Figure 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Yano and Frank (accordance with the teaching of Hayakawa) since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Additionally, since Yano, Frank and Hayakawa are from the same field of endeavor (semiconductor), the purpose disclosed by Hayakawa would have been recognized in the pertinent art of Yano, Frank.

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yano et al. (U.S. 6,083,841) in view of Frank (U.S. 5,277,750) and Cervantes et al. (U.S. 6,379,985) and further in view of Losehand et al. (U.S. 6,448,162).

Yano and Frank teach the above outlined features with the exception of selecting which further comprises forming the substrate to be n-conducting; which further

comprises forming the substrate to be selected from the group consisting of n-doped SiC and n-doped GaN. However, Cervantes discloses a semiconductor device with **(23)** which further comprises forming the substrate to be selected from the group consisting of n-doped GaN (see column 9, lines 23-25). Furthermore, Losehand discloses a Schottky diode with **(22)** which further comprises forming the substrate to be n-conducting (see column 3, lines 19-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Yano, Frank and Cervantes (accordance with the teaching of Losehand) since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Additionally, since Yano, Frank, Cervantes and Losehand are from the same field of endeavor (semiconductors), the purpose disclosed by Losehand would have been recognized in the pertinent art of Yano, Frank and Cervantes.

Allowable Subject Matter

Claims 8-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 26-34 are allowed.

The following is an examiner's statement of reasons for allowance: The examiner has reviewed the prior art in light of applicant's claimed invention and finds that the combined claims define over the prior art. The cited prior art does not disclose or suggest a semiconductor device inter alia the limitations ". .... applying a passivation layer to the surface of the semiconductor body and part of the metal layer, at least a further part of the metal layer not being covered by the passivation layer, wherein applying the passivation layer comprises applying the passivation layer as a continuous passivation layer to the surface of the semiconductor body and the part of the metal layer, applying a mask on the continuous passivation layer, the mask not covering the passivation layer at least in a region in which the passivation layer adjoins the metal layer, removing parts of the passivation layer which are not covered with the mask, and removing the mask. ..."

.Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong A. Luu whose telephone number is (571) 272-1902. The examiner can normally be reached on M-F (6:30-3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chuong A Luu/
Primary Examiner, Art Unit 2892
April 29, 2009